SMART, ENERGY-EFFICIENT AND ADAPTIVE PORT TERMINALS

Implementing Bodies:
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What is a SEA Terminal?

SEA TERMINALS: Smart, Energy-Efficient and Adaptive Port Terminals

SMART:
- Able to **get and manage** information about the **real status** of its different operative processes
- Able to decide the best configuration to achieve the **minimum total cost (operative + energy)**
- **Complete monitoring** of its machinery and activity
- A SEA TERMINAL is able to reduce the number of machines needed for each operation to those strictly necessary by **continuous improvement**

ENERGY-EFFICIENT:
- The terminal uses **more energy efficient equipment** and adapts each individual machine (modes of operation) to the **real operative needs**
- With a more efficient machinery, **less machinery** is required to make the **same work** per vessel
- A SEA TERMINAL not only reduces the consumption by machine, it **reduces the consumption of the operative**, where bigger savings are available

ADAPTIVE
- Within the real status, **real time modifications** and **real time results**
- **Everyday is different in a Port Container Terminal**, a static model will never cover the large amount of situations
What is a SEA Terminal?

Where the project starts?

SEA TERMINALS is the natural continuation of GREENCRANES, a TEN-T co-funded innovation project based on the evaluation of eco-efficient alternatives for port container terminals, including alternative fuels (LNG), electrification of machinery and smart energy management. GREENCRANES has demonstrated that more efficient machinery can be used in ports, producing savings in money (€) and emissions (KgCO₂).

Two Pilots in Noatum Container Terminal Valencia (NCTV)

For more information visit www.greencranes.eu
Quick Deployment of GREENCRANES Products in the Port Sector

portstrategy insight for senior port executives

LNG tractors for new Turkish terminal

08 Jul 2014

Netherlands-based Terberg Benschop is to supply 40 LNG tractors for Asyaport’s new container terminal, being built in Turkey on the Marmara Sea.

The YT222 tractors with 170kW Mercedes engines are powerful enough to handle two trailers carrying 20 inch containers.

Asyaport says it chose LNG as a fuel for its environmental properties and the fact that it’s considerably cheaper in Turkey than diesel. There is also an LNG filling station near the terminal, so maintenance is easy.

Terberg’s Turkish distributor Portunus, based in Istanbul, will provide service and support. Delivery will begin in January 2015.

Asyaport’s new deep-water container terminal is strategically located as a transhipment hub for containers destined for the Black Sea via the Bosphorus. It will handle vessels carrying up to 18,000 teu and will have an annual capacity of around two million teu.

Investors in the terminal include Terminal Investment Ltd SA (TIL), the terminal operating subsidiary of Mediterranean Shipping Company (MSC), and the Soyuer Group in Turkey.

Following this order, Terberg will also supply 28 tractors to TIL’s terminal at Lomé in Togo, West Africa.

Terberg to supply LNG tractors to Turkish terminal

04 Jul 2014 - Terminal Handling

Netherlands-based specialist vehicle manufacturer Terberg Benschop has been chosen to supply 40 LNG-powered tractors for a new, sophisticated container terminal in Turkey.

The Terberg YT222 tractor has a 170kW Mercedes engine, claimed to be powerful enough to handle two trailers carrying 20ft containers.

Servicing and support for the tractors will be provided by Portunus – Terberg Benschop’s Istanbul-based Turkish distributor.

LNG was chosen to power all tractors at the terminal as it eliminates particulate emissions and leads to much lower NOx emissions than diesel. Furthermore, LNG is considerably cheaper in Turkey than diesel and there is an LNG filling station close to the terminal. Delivery of the tractors will commence in January 2015.

To be built by Asyaport on a deep water site, the new terminal will be located around 135km from Istanbul on the Sea of Marmara. The proposed port will be strategically located as a trans-shipment hub for containers destined for the Black Sea via the Bosphorus, and will handle 18,000 TEU vessels; it will have an annual capacity of around two million TEU.

For further information on Terberg Benschop, click here.
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What is a SEA Terminal?

What is a SEA Terminal?

Where the project starts?

NEW SCOPE!

- Reducing operational performance in a machine (Pilot II), significant decreases in energy consumption can be achieved. But does this affect to the other machinery in the operational chain?

- The complete machinery has to be measured to detect these savings or over-costs.

- The principal aim is to save money saving emissions. Nobody will invest in energy-efficient projects if money savings are not involved.

- New prototypes will be tested in SEA Terminals with new technologies in energy-efficient machinery.
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  - Dynamic Lighting
  - Total-Cost Operation
Organization

SEA TERMINALS Consortium and Geographical Scope

Implementing Bodies:
SEA TERMINALS: Three Complementary Approaches for European Ports and Terminals

• Smart Energy Management: Integral Monitoring of Container Terminal (Energy + Operations)
  o Design, prototyping and deployment of a Smart, Energy Efficient and Adaptive Management System – SEAMS Platform
  o Integral Monitoring of Port Container Terminal: SEAMS Platform + BlackBox Concept

• Deployment and Demonstration of Last Generation Low/Zero Emission Prototypes
  o Full Electric Terminal Tractor (SEA-eTractor)
  o Dual-Fuel (SEA-DFRTG) Rubber Tyred Gantry Crane
  o Eco-Efficient Reach Stacker (SEA-EcoRS) and ForkLift (SEA-EcoLIFT)
  o Terminal Dynamic Illumination (SEA-Light)
  o LNG Supply Mobile Module Designed for Port Operations

• Facilitation and Development of an LNG Supply Network for European Ports
EXPECTED RESULTS

• Contribution to a progressive and quick decarbonisation of port container activities in Europe, thus reducing GHG and pollutant emissions.

• Demonstration of feasibility (financial, technical and environmental) of mature integrated solutions based on smart energy management, eco-efficient technologies and alternative fuels applied to port machinery and equipment.

• Provision of an innovative and market-sided approach in the way that energy is managed at port terminals, considering it as key driver for improving operations and competitiveness.

• Promotion of a collaborative framework among ports, port operators and equipment manufacturers, thus establishing new relationships not only based on commercial interests but also on common innovation opportunities.

• Transfer of the project outputs to as many as possible stakeholders at European level in order to accelerate the evolution of the port sector towards a low-carbon emission operative model.
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The SEAMS Concept

Smart Energy-Efficient and Adaptive Management System (SEAMS Platform)

Dynamic Lighting

Monitoring of the Complete machinery

No Bottleneck’s

Two Operation Mode (Turbo-ECO)

Monitoring Data

GPS

KPI
 €/mov
 KgCO₂/mov

Total Cost

STG  RTG  TT  RS  FL

EcoRTG  eTT  EcoRS  EcoFL  DL

On/Off
The SEAMS Concept

Monitor of the Complete Machinery

Monitoring of the Complete machinery
The SEAMS Concept

Monitor of the Complete Machinery

• Signals to monitor:
  • GPS with communication to the SEAMS is needed to monitor the basic data of its states:
    • Location
    • Speed
    • Direction
  • Possible locations to dock/undock
  • Working Hours
  • Route

• Detection of the Twistlocks and position of the Spreader is very useful to detect container handlings.

• Interrogating the PLC to extract movements of the machines to give more intelligence to the SEAMS and give extra functionalities for Safety (BlackBox) and Maintenance

• Fuel levels to predict refueling and save time.
The SEAMS Concept

Dynamic Lighting

Monitoring of the Complete machinery

Dynamic Lighting

GPS

SEAMS
The SEAMS Concept

- Dynamic Lighting will provide just the needed illumination conditions according to the real operations taking place at the terminal, using GPS information from the machinery.
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The SEAMS Concept

Dynamic Lighting

• Dynamic Lighting will provide just the needed illumination conditions according the real operations taking place at the terminal, using GPS information from the machinery.

• Only machines can circulate by the terminal at night.

• The tower Lights provides.

• The LED Technology allows this type of dimming, large amount of energy is saved due to the use of LED, that consumes a 70% less than the actual technology, combined with the dynamic lighting an 85% in electrical savings are estimated.

• Dynamic Lighting makes the use of energy more efficient.
The SEAMS Concept

- Two Operation mode Eco Machinery prototypes

Monitoring of the Complete machinery

Two Operation Mode (Turbo-ECO)

No Bottleneck’s
The SEAMS Concept

- Two Operation mode Eco Machinery prototypes

- 4 Prototypes will be tested at Noatum Container Terminal Valencia.
  - 1 Full Electric Yard Truck developed by Terberg Benchshop
  - 2 Eco-Front Lifts developed by Hyster
  - 1 Eco-Reach Stacker developed by Hyster

- Each prototype has two modes of operation: Eco-Mode and Turbo-Mode. If the machine is the bottleneck or is involved in a bottleneck, the Turbo-Mode is activated automatically by the SEAMS to avoid the bottleneck and to not slow down other machinery

- This is only feasible if data from the entire terminal is available, in order to detect over-costs in other machines

- Combining the savings of the eco-machinery and the savings by operation the terminal saves a big amount of costs (energy + operation) and reduces also the emissions
The SEAMS Concept

- Total Cost and CO₂ KPI’S

**SEAMS**

Monitoring of the Complete machinery

Monitoring Data

STS RTG TT RS FL

Monitoring Data

EcoRTG eTT EcoRS EcoFL DL

Two Operation Mode (Turbo-ECO)

KPI

- €/mov
- KgCO₂/mov

Total Cost

No Bottleneck’s
The SEAMS Concept

- Total Cost and CO$_2$ KPI’S

- With all the data stored, the total cost of the operation and the CO$_2$ emissions can be obtained in real time (5-10 seconds), allowing the Operations Department to respond and adapt its decisions according to the information received.

- This is only the real KPI to reduce the cost in operations per movement, other types of analysis can be made with the stored data but not in real time.

- The SEAMS Concept not only impacts positively on operations, it also reduces energy costs and GHG emissions in iterative cycles (continuous improvement).

- Introduces the industrial approach (monitoring + control) within container port-logistic processes.
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